

WHAT IS CLAIMED IS:

1. A highly utilizable protection mechanism for WDM mesh network comprising of;

5 a step of waiting randomly generated channel request which is a request to generate channel between source node and target node,

a step of finding shortest path set within limit of hop length,

10 a step of finding disjointed path set for each path of the shortest path set,

a step of making pairs using shortest path set and disjoint path set for WP and BP,

15 a step of calculating cost by using cost function considering current network state,

a step of sorting the cost lists from minimum cost to maximum cost,

a step of selecting best pair having minimum cost, and

20 a step of checking whether each link has enough capacity to allocate channel resources for the channel request with best working and backup path pair having minimum cost,

wherein said step of calculating cost is as follow;

$$Cost^* = (W_1 \times AC + W_2 \times (WC + BC) + W_3 \times CC)$$

25 , where $W_1 \ll W_2 \ll W_3$, W_j is much bigger than W_i , $i < j$,

$i=\{1,2,\}$ and $j=\{2,3\}$

, where $AC = [\sum_{i \in WP} \sum_{j \in BP} (R_{Allocated_i} + R_{Allocated_j})]_{Average}$

where $R_{Allocated}$ is average rate of previously allocated wavelengths compared to total link capacity in the links passed by WP or BP,

, where $BC = \min_j (BR_j - SBR_j), j=1, \dots, W$, where BR_j is required number of wavelengths for BP reservation in the j th wavelength number, SBR_j is the number of sharable wavelength for BP reservation in the j th wavelength number,

, where CC (Capacity Cost) = 1 if there is no more wavelength to allocate on a link which WP and BP pass by,

, where WC (Working path Cost) means the cost of reserving working path.

2. A highly utilizable protection mechanism for WDM mesh network according to claim 1, wherein after said step of checking whether each link has enough capacity, if a result of checking is enough wavelength for both WP and BP, then a step of accepting said channel request, and if not, then a step of rejecting said channel request.

3. A highly utilizable protection mechanism for WDM mesh network comprising of;

a step of producing a shortest path set when channel request is generated, wherein channel request is a request to generate channel between source node and target node,

a step of selecting disjoint path set to select working path and backup path in said path set,

a step of calculating cost by using cost function considering current network state,

a step of selecting best pair having minimum cost, and

a step of allocating resources by checking whether each link has enough capacity to allocate channel resources for the channel request with best working and backup path pair having minimum cost,

wherein said step of calculating cost is as follow;

$$Cost^* = (W_1 \times AC + W_2 \times (WC + BC) + W_3 \times CC)$$

, where $W_1 \ll W_2 \ll W_3$, W_j is much bigger than W_i , $i < j$, $i=\{1,2\}$ and $j=\{2,3\}$

$$AC = \left[\sum_{i \in WP} \sum_{j \in BP} (R_{Allocated_i} + R_{Allocated_j}) \right]_{Average}$$

where $R_{Allocated}$ is average rate of previously allocated wavelengths compared to total link capacity in the links passed by WP or BP,

, where $BC = \min_j (BR_j - SBR_j)$, $j=1, \dots, W$, where BR_j is required

number of wavelengths for BP reservation in the j th wavelength number, SBR_j is the number of sharable wavelength for BP reservation in the j th wavelength number,

5 ,where CC (Capacity Cost) = 1 if there is no more wavelength to allocate on a link which WP and BP pass by,

,where WC (Working path Cost) means the cost of reserving working path.

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4. A highly utilizable protection mechanism for WDM mesh network comprising of;

a step of waiting randomly generated channel request which is a request to generate channel between source node and target node,

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a step of finding shortest path set within limit of hop length,

a step of finding disjointed path set for each path of the shortest path set,

20

a step of making pairs using shortest path set and disjoint path set for WP and BP,

a step of calculating cost by using cost function considering current network state,

a step of sorting the cost lists from minimum cost to

25

maximum cost,

a step of selecting best pair having minimum cost, and
a step of checking whether each link has enough
capacity to allocate channel resources for the channel
request with best working and backup path pair having
5 minimum cost,

wherein said step of calculating cost calculates cost
using the sum value of allocated average wavelength
rate, capacity of allocating resources, and amount of
necessary resources.

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5. A highly utilizable protection mechanism for WDM
mesh network according to claim 4,

wherein after said step of checking whether each link
has enough capacity, if a result of checking is enough
15 wavelength for both WP and BP, then a step of
accepting said channel request, and if not, then a
step of rejecting said channel request.

6. A highly utilizable protection mechanism for WDM
20 mesh network comprising of;

a step of producing a shortest path set when channel
request is generated, wherein channel request is a
request to generate channel between source node and
target node,

25 a step of selecting disjoint path set to select

working path and backup path in said path set,
a step of calculating cost by using cost function
considering current network state,
a step of selecting best pair having minimum cost, and
5 a step of allocating resources by checking whether
each link has enough capacity to allocate channel
resources for the channel request with best working
and backup path pair having minimum cost,
wherein said step of calculating cost calculates cost
10 using the sum value of allocated average wavelength
rate, capacity of allocating resources, and amount of
necessary resources.

7. A highly utilizable protection mechanism for WDM
15 mesh network,
wherein said method uses calculated cost; and
wherein said cost is the sum value of allocated
average wavelength rate, capacity of allocating
resources, and amount of necessary resources.

20 8. A highly utilizable protection mechanism for WDM
mesh network,
wherein said method uses calculated cost; and
wherein said cost is as follow;

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$$Cost^* = (W_1 \times AC + W_2 \times (WC + BC) + W_3 \times CC)$$

, where $W_1 \ll W_2 \ll W_3$, W_j is much bigger than W_i , $i < j$,
 $i=\{1,2,\}$ and $j=\{2,3\}$

, where $AC = [\sum_{i \in WP} \sum_{j \in BP} (R_{Allocated_i} + R_{Allocated_j})]_{Average}$

where $R_{Allocated}$ is average rate of previously
 5 allocated wavelengths compared to total link capacity
 in the links passed by WP or BP,

, where $BC = \min_j (BR_j - SBR_j)$, $j=1,...,W$, where BR_j is required
 number of wavelengths for BP reservation in the j th
 wavelength number, SBR_j is the number of sharable
 10 wavelength for BP reservation in the j th wavelength
 number,

, where CC (Capacity Cost) = 1 if there is no more
 wavelength to allocate on a link which WP and BP pass
 by,

15 , where WC (Working path Cost) means the cost of
 reserving working path.